Refine Search

Search Results -

Terms	Documents
L1 and (multimedia or multi-media) and vector$2 and train$3 and classif$8	23

Database:

US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L3

Refine Search

Recall Text

Clear

Interrupt

Search History

DATE: Monday, January 16, 2006 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
	DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=NO; OP=OR		
L3	L1 and (multimedia or multi-media) and vector$2 and train$3 and classif$8	23	L3
L2	L1 (multimedia or multi-media) and vector$2 and train$3 and classif$8	1911	L2
L1	382/159	912	L1

END OF SEARCH HISTORY

Refine Search

Search Results -

Terms	Documents
L7 and (multimedia or multi-media) and vector$2 and train$3 and classif$8 and quant$	12

Database:

US Pre-Grant Publication Full-Text Database
US Patents Full-Text Database
US OCR Full-Text Database
EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L8

Refine Search

Recall Text Clear Interrupt

Search History

DATE: Monday, January 16, 2006 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
	DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=NO; OP=OR		
L8	L7 and (multimedia or multi-media) and vector$2 and train$3 and classif$8 and quant$	12	L8
L7	382/253	654	L7
L6	L5 and (multimedia or multi-media) and vector$2 and train$3 and classif$8 and quant$	7	L6
L5	382/160	226	L5
L4	L3 and quant$	16	L4
L3	L1 and (multimedia or multi-media) and vector$2 and train$3 and classif$8	23	L3
L2	L1 (multimedia or multi-media) and vector$2 and train$3 and classif$8	1911	L2
L1	382/159	912	L1

END OF SEARCH HISTORY

Hit List

First Hit Your wildcard search against 10000 terms has yielded the results below.

Your result set for the last L# is incomplete.

The probable cause is use of unlimited truncation. Revise your search strategy to use limited truncation.

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 1 through 16 of 16 returned.

☐ 1. Document ID: US 20040120572 A1

Using default format because multiple data bases are involved.

L4: Entry 1 of 16 File: PGPB Jun 24, 2004

PGPUB-DOCUMENT-NUMBER: 20040120572
PGPUB-FILING-TYPE: new
DOCUMENT-IDENTIFIER: US 20040120572 A1

TITLE: Method for using effective spatio-temporal image recomposition to improve scene classification

PUBLICATION-DATE: June 24, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Luo, Jiebo	Pittsford	NY	US
Gray, Robert T.	Rochester	NY	US
Boutell, Matthew R.	Rochester	NY	US

US-CL-CURRENT: 382/159; 382/224

Full | Title | Citation | Front | Review | Classification | Date | Reference | Sequences | Attachments | Claims | KWIC | Draw De

☐ 2. Document ID: US 6915025 B2

L4: Entry 2 of 16 File: USPT Jul 5, 2005

US-PAT-NO: 6915025
DOCUMENT-IDENTIFIER: US 6915025 B2

TITLE: Automatic image orientation detection based on classification of low-level image features

DATE-ISSUED: July 5, 2005

INVENTOR-INFORMATION:

NAME CITY STATE ZIP CODE COUNTRY

Wang; Yongmei	Hong Kong	HK
Zhang; Hong-Jiang	Beijing	CN

US-CL-CURRENT: 382/289; 382/165, 382/190

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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3. Document ID: US 6847680 B2

L4: Entry 3 of 16 File: USPT Jan 25, 2005

US-PAT-NO: 6847680
DOCUMENT-IDENTIFIER: US 6847680 B2

TITLE: Method for detecting talking heads in a compressed video

DATE-ISSUED: January 25, 2005

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Divakaran; Ajay	Denville	NJ		
Radhakrishnan; Regunathan	Ozone Park	NY		

US-CL-CURRENT: 375/240.01; 375/240.08

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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4. Document ID: US 6816847 B1

L4: Entry 4 of 16 File: USPT Nov 9, 2004

US-PAT-NO: 6816847
DOCUMENT-IDENTIFIER: US 6816847 B1

TITLE: computerized aesthetic judgment of images

DATE-ISSUED: November 9, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Toyama; Kentaro	Redmond	WA		

US-CL-CURRENT: 706/14; 382/156, 382/157, 382/158, 382/159, 382/224, 706/18, 706/20

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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5. Document ID: US 6760714 B1

L4: Entry 5 of 16 File: USPT Jul 6, 2004

US-PAT-NO: 6760714
DOCUMENT-IDENTIFIER: US 6760714 B1
**** See image for Certificate of Correction ****

TITLE: Representation and retrieval of images using content vectors derived from image information elements

DATE-ISSUED: July 6, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Caid; William R.	San Diego	CA		
Hecht-Neilsen; Robert	Del Mar	CA		

US-CL-CURRENT: 706/14; 382/116, 382/228

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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☐ 6. Document ID: US 6751354 B2

L4: Entry 6 of 16 File: USPT Jun 15, 2004

US-PAT-NO: 6751354
DOCUMENT-IDENTIFIER: US 6751354 B2

TITLE: Methods and apparatuses for video segmentation, classification, and retrieval using image class statistical models

DATE-ISSUED: June 15, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Foote; Jonathan T.	Menlo Park	CA		
Wilcox; Lynn	Portola Valley	CA		
Girgensohn; Andreas	Menlo Park	CA		

US-CL-CURRENT: 382/224; 348/395.1, 348/405.1, 348/408.1, 382/190, 382/209, 382/218, 382/220

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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☐ 7. Document ID: US 6640145 B2

L4: Entry 7 of 16 File: USPT Oct 28, 2003

US-PAT-NO: 6640145
DOCUMENT-IDENTIFIER: US 6640145 B2

TITLE: Media recording device with packet data interface

DATE-ISSUED: October 28, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hoffberg; Steven	West Harrison	NY	10604	
Hoffberg-Borghesani; Linda	Acton	MA	01720	

US-CL-CURRENT: 700/83; 700/17, 700/19, 700/23, 704/200, 704/201, 704/7, 709/200, 709/201, 709/202

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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8. Document ID: US 6487545 B1

L4: Entry 8 of 16 File: USPT Nov 26, 2002

US-PAT-NO: 6487545
DOCUMENT-IDENTIFIER: US 6487545 B1

TITLE: Methods and apparatus for classifying terminology utilizing a knowledge catalog

DATE-ISSUED: November 26, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wical; Kelly	Redwood Shores	CA		

US-CL-CURRENT: 706/45

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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9. Document ID: US 6418424 B1

L4: Entry 9 of 16 File: USPT Jul 9, 2002

US-PAT-NO: 6418424
DOCUMENT-IDENTIFIER: US 6418424 B1

TITLE: Ergonomic man-machine interface incorporating adaptive pattern recognition based control system

DATE-ISSUED: July 9, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hoffberg; Steven M.	West Harrison	NY	10604	
Hoffberg-Borghesani; Linda I.	Acton	MA	01720	

US-CL-CURRENT: 706/21; 434/178, 706/52

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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☐ 10. Document ID: US 6404925 B1

L4: Entry 10 of 16 File: USPT Jun 11, 2002

US-PAT-NO: 6404925
DOCUMENT-IDENTIFIER: US 6404925 B1

TITLE: Methods and apparatuses for segmenting an audio-visual recording using image similarity searching and audio speaker recognition

DATE-ISSUED: June 11, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Foote; Jonathan T.	Menlo Park	CA		
Wilcox; Lynn	Portola Valley	CA		

US-CL-CURRENT: 382/224; 348/480, 348/484, 358/403, 382/159, 382/173, 382/190, 382/197, 382/209, 382/225, 382/227, 382/276, 382/305, 704/239, 704/243, 704/245, 707/1, 707/3

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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☐ 11. Document ID: US 6400996 B1

L4: Entry 11 of 16 File: USPT Jun 4, 2002

US-PAT-NO: 6400996
DOCUMENT-IDENTIFIER: US 6400996 B1

TITLE: Adaptive pattern recognition based control system and method

DATE-ISSUED: June 4, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hoffberg; Steven M.	West Harrison	NY	10994	
Hoffberg-Borghesani; Linda I.	Acton	MA	01720	

US-CL-CURRENT: 700/83; 370/218, 370/355, 700/17, 700/24, 700/25, 700/86, 700/87, 709/223, 709/227, 715/810, 715/840, 715/841, 718/102, 719/318

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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☐ 12. Document ID: US 6397200 B1

L4: Entry 12 of 16 File: USPT May 28, 2002

US-PAT-NO: 6397200

DOCUMENT-IDENTIFIER: US 6397200 B1

TITLE: Data reduction system for improving classifier performance

DATE-ISSUED: May 28, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lynch, Jr.; Robert S.	Groton	CT		
Willett; Peter K.	Coventry	CT		

US-CL-CURRENT: 706/20; 702/181

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

13. Document ID: US 6173275 B1

L4: Entry 13 of 16 File: USPT Jan 9, 2001

US-PAT-NO: 6173275
DOCUMENT-IDENTIFIER: US 6173275 B1
**** See image for Certificate of Correction ****

TITLE: Representation and retrieval of images using context vectors derived from image information elements

DATE-ISSUED: January 9, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Caid; William R.	San Diego	CA		
Hecht-Neilsen; Robert	Del Mar	CA		

US-CL-CURRENT: 706/14; 382/190, 382/195, 382/224, 382/225, 706/12, 706/934

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

14. Document ID: US 6072542 A

L4: Entry 14 of 16 File: USPT Jun 6, 2000

US-PAT-NO: 6072542
DOCUMENT-IDENTIFIER: US 6072542 A

TITLE: Automatic video segmentation using hidden markov model

DATE-ISSUED: June 6, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY

Wilcox; Lynn D.	Portola Valley	CA
Boreczky; John S.	San Leandro	CA

US-CL-CURRENT: 348/722; 348/700, 348/701, 382/155, 382/156, 382/157, 382/160, 386/68, 386/69, 386/95, 386/96

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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15. Document ID: US 5987459 A

L4: Entry 15 of 16 File: USPT Nov 16, 1999

US-PAT-NO: 5987459
DOCUMENT-IDENTIFIER: US 5987459 A
**** See image for Certificate of Correction ****

TITLE: Image and document management system for content-based retrieval

DATE-ISSUED: November 16, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Swanson; Mitchell D.	Minneapolis	MN		
Tewfik; Ahmed H.	Edina	MN		
Hosur; Srinath	Plano	TX		

US-CL-CURRENT: 707/6; 707/3, 707/9

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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16. Document ID: US 5822465 A

L4: Entry 16 of 16 File: USPT Oct 13, 1998

US-PAT-NO: 5822465
DOCUMENT-IDENTIFIER: US 5822465 A

TITLE: Image encoding by vector quantization of regions of an image and codebook updates

DATE-ISSUED: October 13, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Normile; James Oliver	Sunnyvale	CA		
Wang; Katherine Shu-Wei	San Jose	CA		

US-CL-CURRENT: 382/253; 382/239

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L3 and quant$	16

Display Format: - Change Format

Previous Page Next Page Go to Doc#

Hit List

First Hit | Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 1 through 7 of 7 returned.

☐ 1. Document ID: US 6751354 B2

Using default format because multiple data bases are involved.

L6: Entry 1 of 7 File: USPT Jun 15, 2004

US-PAT-NO: 6751354
DOCUMENT-IDENTIFIER: US 6751354 B2

TITLE: Methods and apparatuses for video segmentation, classification, and retrieval using image class statistical models

DATE-ISSUED: June 15, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Foote; Jonathan T.	Menlo Park	CA		
Wilcox; Lynn	Portola Valley	CA		
Girgensohn; Andreas	Menlo Park	CA		

US-CL-CURRENT: 382/224; 348/395.1, 348/405.1, 348/408.1, 382/190, 382/209, 382/218, 382/220

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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☐ 2. Document ID: US 6678413 B1

L6: Entry 2 of 7 File: USPT Jan 13, 2004

US-PAT-NO: 6678413
DOCUMENT-IDENTIFIER: US 6678413 B1

TITLE: System and method for object identification and behavior characterization using video analysis

DATE-ISSUED: January 13, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Liang; Yiqing	Vienna	VA	22182	
Crnic; Linda	Denver	CO	80224	
Kobla; Vikrant	Ashburn	VA	20147	
Wolf; Wayne	Princeton	NJ	08540	

US-CL-CURRENT: 382/181; 348/169

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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3. Document ID: US 6574378 B1

L6: Entry 3 of 7 File: USPT Jun 3, 2003

US-PAT-NO: 6574378
DOCUMENT-IDENTIFIER: US 6574378 B1

TITLE: Method and apparatus for indexing and retrieving images using visual keywords

DATE-ISSUED: June 3, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lim; Joo Hwee	Singapore			SG

US-CL-CURRENT: 382/305; 358/403

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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4. Document ID: US 6081750 A

L6: Entry 4 of 7 File: USPT Jun 27, 2000

US-PAT-NO: 6081750
DOCUMENT-IDENTIFIER: US 6081750 A

TITLE: Ergonomic man-machine interface incorporating adaptive pattern recognition based control system

DATE-ISSUED: June 27, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hoffberg; Steven Mark	Yonkers	NY	10701-1705	
Hoffberg-Borghesani; Linda Irene	Acton	MA	01720	

US-CL-CURRENT: 700/17; 345/520, 700/11, 700/56, 700/83, 700/86

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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5. Document ID: US 6072542 A

L6: Entry 5 of 7 File: USPT Jun 6, 2000

US-PAT-NO: 6072542

DOCUMENT-IDENTIFIER: US 6072542 A

TITLE: Automatic video segmentation using hidden markov model

DATE-ISSUED: June 6, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wilcox; Lynn D.	Portola Valley	CA		
Boreczky; John S.	San Leandro	CA		

US-CL-CURRENT: 348/722; 348/700, 348/701, 382/155, 382/156, 382/157, 382/160, 386/68, 386/69, 386/95, 386/96

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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6. Document ID: US 5875108 A

L6: Entry 6 of 7 File: USPT Feb 23, 1999

US-PAT-NO: 5875108
DOCUMENT-IDENTIFIER: US 5875108 A

TITLE: Ergonomic man-machine interface incorporating adaptive pattern recognition based control system

DATE-ISSUED: February 23, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Hoffberg; Steven M.	Yonkers	NY	10701-1705	
Hoffberg-Borghesani; Linda I.	Acton	MA	01720	

US-CL-CURRENT: 700/17; 382/181, 382/190, 700/83

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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7. Document ID: US 5822465 A

L6: Entry 7 of 7 File: USPT Oct 13, 1998

US-PAT-NO: 5822465
DOCUMENT-IDENTIFIER: US 5822465 A

TITLE: Image encoding by vector quantization of regions of an image and codebook updates

DATE-ISSUED: October 13, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Normile; James Oliver	Sunnyvale	CA		
Wang; Katherine Shu-Wei	San Jose	CA		

US-CL-CURRENT: 382/253; 382/239

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Terms	Documents
L5 and (multimedia or multi-media) and vector$2 and train$3 and classif$8 and quant$	7

Display Format: - Change Format

Previous Page Next Page Go to Doc#

Hit List

First Hit | Clear | Generate Collection | Print | Fwd Refs | Bkwd Refs | Generate OACS

Search Results - Record(s) 1 through 12 of 12 returned.

☐ 1. Document ID: US 6870962 B2

Using default format because multiple data bases are involved.

L8: Entry 1 of 12 File: USPT Mar 22, 2005

US-PAT-NO: 6870962
DOCUMENT-IDENTIFIER: US 6870962 B2

TITLE: Method and apparatus for efficiently encoding chromatic images using non-orthogonal basis functions

DATE-ISSUED: March 22, 2005

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lee; Te-Won	San Diego	CA		
Wachtler; Thomas	Freiburg			DE
Sejnowski; Terrence J.	Solana Beach	CA		

US-CL-CURRENT: 382/248; 382/233, 382/240

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

☐ 2. Document ID: US 6826524 B1

L8: Entry 2 of 12 File: USPT Nov 30, 2004

US-PAT-NO: 6826524
DOCUMENT-IDENTIFIER: US 6826524 B1

TITLE: Sample-adaptive product quantization

DATE-ISSUED: November 30, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kim; Dong Sik	Sungnam-Si			KR
Shroff; Ness B.	Lafayette	IN		

US-CL-CURRENT: 704/200

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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3. Document ID: US 6760714 B1

L8: Entry 3 of 12 File: USPT Jul 6, 2004

US-PAT-NO: 6760714
DOCUMENT-IDENTIFIER: US 6760714 B1
**** See image for Certificate of Correction ****

TITLE: Representation and retrieval of images using content vectors derived from image information elements

DATE-ISSUED: July 6, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Caid; William R.	San Diego	CA		
Hecht-Neilsen; Robert	Del Mar	CA		

US-CL-CURRENT: 706/14; 382/116, 382/228

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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4. Document ID: US 6738512 B1

L8: Entry 4 of 12 File: USPT May 18, 2004

US-PAT-NO: 6738512
DOCUMENT-IDENTIFIER: US 6738512 B1

TITLE: Using shape suppression to identify areas of images that include particular shapes

DATE-ISSUED: May 18, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Chen; Xiangrong	Beijing			CN
Zhang; Hong-Jiang	Beijing			CN

US-CL-CURRENT: 382/176; 382/200, 382/203

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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5. Document ID: US 6571016 B1

L8: Entry 5 of 12 File: USPT May 27, 2003

US-PAT-NO: 6571016
DOCUMENT-IDENTIFIER: US 6571016 B1

**** See image for Certificate of Correction ****

TITLE: Intra compression of pixel blocks using predicted mean

DATE-ISSUED: May 27, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Mehrotra; Sanjeev	Kirkland	WA		
Wang; Albert S.	Kirkland	WA		

US-CL-CURRENT: 382/236; 375/240.13

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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6. Document ID: US 6404923 B1

L8: Entry 6 of 12 File: USPT Jun 11, 2002

US-PAT-NO: 6404923
DOCUMENT-IDENTIFIER: US 6404923 B1
**** See image for Certificate of Correction ****

TITLE: Table-based low-level image classification and compression system

DATE-ISSUED: June 11, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Chaddha; Navin	Stanford	CA		

US-CL-CURRENT: 382/224; 382/240, 382/253

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

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7. Document ID: US 6397200 B1

L8: Entry 7 of 12 File: USPT May 28, 2002

US-PAT-NO: 6397200
DOCUMENT-IDENTIFIER: US 6397200 B1

TITLE: Data reduction system for improving classifier performance

DATE-ISSUED: May 28, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Lynch, Jr.; Robert S.	Groton	CT		
Willett; Peter K.	Coventry	CT		

US-CL-CURRENT: 706/20; 702/181

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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8. Document ID: US 6173275 B1

L8: Entry 8 of 12 File: USPT Jan 9, 2001

US-PAT-NO: 6173275
DOCUMENT-IDENTIFIER: US 6173275 B1
**** See image for Certificate of Correction ****

TITLE: Representation and retrieval of images using context vectors derived from image information elements

DATE-ISSUED: January 9, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Caid; William R.	San Diego	CA		
Hecht-Neilsen; Robert	Del Mar	CA		

US-CL-CURRENT: 706/14; 382/190, 382/195, 382/224, 382/225, 706/12, 706/934

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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9. Document ID: US 5822465 A

L8: Entry 9 of 12 File: USPT Oct 13, 1998

US-PAT-NO: 5822465
DOCUMENT-IDENTIFIER: US 5822465 A

TITLE: Image encoding by vector quantization of regions of an image and codebook updates

DATE-ISSUED: October 13, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Normile; James Oliver	Sunnyvale	CA		
Wang; Katherine Shu-Wei	San Jose	CA		

US-CL-CURRENT: 382/253; 382/239

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw De

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10. Document ID: US 5802208 A

L8: Entry 10 of 12 File: USPT Sep 1, 1998

US-PAT-NO: 5802208
DOCUMENT-IDENTIFIER: US 5802208 A

TITLE: Face recognition using DCT-based feature vectors

DATE-ISSUED: September 1, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Podilchuk; Christine Irene	Bridgewater	NJ		
Zhang; Xiaoyu	Piscataway	NJ		

US-CL-CURRENT: 382/224; 382/115, 382/250, 382/253

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

11. Document ID: US 5649030 A

L8: Entry 11 of 12 File: USPT Jul 15, 1997

US-PAT-NO: 5649030
DOCUMENT-IDENTIFIER: US 5649030 A
**** See image for Certificate of Correction ****

TITLE: Vector quantization

DATE-ISSUED: July 15, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Normile; James Oliver	Sunnyvale	CA		
Wang; Katherine Shu-Wei	San Jose	CA		

US-CL-CURRENT: 382/253; 348/417.1, 348/418.1, 382/251

Full | Title | Citation | Front | Review | Classification | Date | Reference | Claims | KWIC | Draw De

12. Document ID: US 5596659 A

L8: Entry 12 of 12 File: USPT Jan 21, 1997

US-PAT-NO: 5596659
DOCUMENT-IDENTIFIER: US 5596659 A
**** See image for Certificate of Correction ****

TITLE: Preprocessing and postprocessing for vector quantization

DATE-ISSUED: January 21, 1997

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Normile; James O.	Sunnyvale	CA		
Wang; Katherine S.	San Jose	CA		
Wu; Hsi-Jung	Cupertino	CA		

US-CL-CURRENT: 382/253; 348/422.1, 382/299

Full | Title | Citation | Front | Review | Classification | Date | Reference | | | Claims | KWIC | Draw D

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Terms	Documents
L7 and (multimedia or multi-media) and vector$2 and train$3 and classif$8 and quant$	12

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(classify classification) and ((audiovisual audio visual video) same (score and database)) and train and vector	23

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	DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=NO; OP=OR		
L18	(classify classification) and ((audiovisual audio visual video) same (score and database)) and train and vector	23	L18
L17	(classify classification) and ((audiovisual audio visual video) same (scorer and database)) and train and vector	0	L17
L16	classify and audiovisual and score and train and vector and database	19	L16
L15	L10 and video and (score or rank$)	4	L15
L14	L11 and (score or rank$)	0	L14
L13	L9 and (score or rank$)	8	L13
L12	L11 and dictionar$	1	L12
L11	L8 and database	3	L11
L10	L6 and database	5	L10
L9	L4 and database	12	L9

L8	L7 and (multimedia or multi-media) and vector$2 and train$3 and classif$8 and quant$	12	L8
L7	382/253	654	L7
L6	L5 and (multimedia or multi-media) and vector$2 and train$3 and classif$8 and quant$	7	L6
L5	382/160	226	L5
L4	L3 and quant$	16	L4
L3	L1 and (multimedia or multi-media) and vector$2 and train$3 and classif$8	23	L3
L2	L1 (multimedia or multi-media) and vector$2 and train$3 and classif$8	1911	L2
L1	382/159	912	L1

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L17	(classify classification) and ((audiovisual audio visual video) same (scorer and database)) and train and vector	0	L17
L16	classify and audiovisual and score and train and vector and database	19	L16
L15	L10 and video and (score or rank$)	4	L15
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L13	L9 and (score or rank$)	8	L13
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L10	L6 and database	5	L10
L9	L4 and database	12	L9

L8	L7 and (multimedia or multi-media) and vector$2 and train$3 and classif$8 and quant$	12	L8
L7	382/253	654	L7
L6	L5 and (multimedia or multi-media) and vector$2 and train$3 and classif$8 and quant$	7	L6
L5	382/160	226	L5
L4	L3 and quant$	16	L4
L3	L1 and (multimedia or multi-media) and vector$2 and train$3 and classif$8	23	L3
L2	L1 (multimedia or multi-media) and vector$2 and train$3 and classif$8	1911	L2
L1	382/159	912	L1

END OF SEARCH HISTORY

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Search Results -

Terms	Documents
L19 or L18	24

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	DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=NO; OP=OR		
L20	L19 or L18	24	L20
L19	(pattern near3 (match matching)) and ((audiovisual audio visual video) same (score and database)) and train and vector	7	L19
L18	(classify classification) and ((audiovisual audio visual video) same (score and database)) and train and vector	23	L18
L17	(classify classification) and ((audiovisual audio visual video) same (scorer and database)) and train and vector	0	L17
L16	classify and audiovisual and score and train and vector and database	19	L16
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L6	L5 and (multimedia or multi-media) and vector$2 and train$3 and classif$8 and quant$	7	L6
L5	382/160	226	L5
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L3	L1 and (multimedia or multi-media) and vector$2 and train$3 and classif$8	23	L3
L2	L1 (multimedia or multi-media) and vector$2 and train$3 and classif$8	1911	L2
L1	382/159	912	L1

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IEEE Pacific Rim Conference on Communications, Computers and Signal Processing
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SPEECH QUALITY ASSESSMENT USING EXPERT PATTERN RECOGNITION TECHNIQUES*

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Abstract

Automatic assessment of voice transmission quality is increasingly important to users and providers of communication services and products. Human listener panels currently provide subjective voice quality information. However, this approach can be slow, expensive, and unreliable. An objective method for assessing quality based on statistical pattern recognition and expert system techniques is described here.

1. Introduction

Background

Assessment of voice transmission quality is important to users and providers of telecommunication services, as well as to standards organizations. Unfortunately, subjective assessment using human listeners can be expensive, slow, and unreliable. Development of an accurate and consistent objective method for voice quality assessment represents an important and widespread need.

Recent efforts to develop an objective measure of voice quality are based on parameters measured directly from the input and output speech [1-4]. While several proposed objective parameters have shown good correlation with subjective scores for some types of distortion, further study is required to determine their effectiveness over a wide variety of conditions and impairments.

System Overview

This paper proposes an Expert Pattern Recognition (EPR) system for objective voice quality assessment. The proposed system uses a combination of expert systems techniques and statistical pattern recognition (SPR) methods. It offers several potential advantages over previous methods based on a single voice parameter: (1) This is a multivariate technique that uses an optimized set of objective parameters for improved accuracy; (2) In addition to predicting Mean Opinion Score (MOS), the system estimates opinion score frequencies, i.e. the probability of each quality class: P(excellent), P(good), P(fair), P(poor), P(unacceptable); (3) Expert system techniques provide the capability to logically integrate SPR results with other knowledge bases to account for factors such as transmission delay, which are not dealt with in the SPR system.

The system first undergoes a training phase, which selects rules and facts for the expert system and statistical parameters for the SPR design. Training requires a speech database containing a standard speech source, processed speech representing impairments relevant to the intended applications, and complete subjective scores for the processed speech. Using the training data, an optimum set of voice parameters is selected from over 200 candidates using a bottom-up evaluation technique described below. The parameter set's probability density function is estimated for each type of distortion using a Gaussian mixture model (i.e. weighted sum of Gaussian functions). These densities define the statistical parameters for the SPR system.

In the second phase, standard voice source is played into the device or channel being tested, and an assessment is made on the output signal. Objective parameter values are measured and analyzed by the EPR system, which uses training statistics to produce the quality assessment. This process is illustrated in Fig. 1 and is described below.

2. Parameter Evaluation

The system is capable of using multiple voice parameters for its assessment. Many of the parameters used in this research were adapted from published work in voice quality, speaker identification, and speech recognition. An evaluation algorithm is used to identify a small subset of these parameters that will provide the best possible performance.

Parameter Measurement

Parameters are measured on either the output (impaired) speech only, or they measure distortion between input and output speech. Some examples of measured parameters are

- Output speech parameters: linear predictive coding (LPC) related measures including partial correlation (PARCOR) coefficients, log area ratios, and cepstral coefficients; spectral measures such as spectral flatness and average power weighted frequency
- Distortion parameters: signal-to-noise ratio; measures of spectral distortion; coherence-based measures such as signal-to-distortion ratio in particular frequency bands; cepstral distance

Search Method

Maximum system performance is realized only with an optimum set of objective parameters. Exhaustive evaluation of all possible combinations of parameters yields an optimal parameter set but is computationally prohibitive. Thus, a more useful approach is a suboptimal, "bottom-up" search that examines only selected combinations [5]. The algorithm successively adds parameters that most improve performance and removes parameters that are no longer useful.

There are several metrics for evaluating performance. Two useful metrics are chi-squared error and mean-squared error of predicted MOS. Chi-squared error is

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measured between the predicted opinion score frequencies and the known listener panel opinion score frequencies. It measures the system's ability to model the listener panel and provides an overall measure of prediction accuracy. In contrast, the mean-squared error metric only measures how well the system predicts mean opinion score and is therefore less useful than the chi-squared error metric.

3. Voice Quality Classification and Prediction

Voice quality prediction is accomplished by analyzing training data from representative types of distortions. A statistical assessment is formed from the estimated probability density functions of the voice parameters. This assessment consists of estimated opinion score probabilities, mean opinion score, and most likely opinion score.

Distortion Probability

A vector of parameters measured from the i-th frame of the test speech (unknown voice quality), X, is represented by x_i. $p(x_i|d_m)$ is the conditional probability density function of x_i for the m-th distortion. It is estimated using a k-nearest neighbor method [6] by

$$p(x_i|d_m) = (k-1) \;/\; (N_{dm} \cdot v(x_i)). \tag{1}$$

Here, N_{dm} is the total number of training samples in the m-th distortion, and $v(x_i)$ is the volume of a hypersphere with radius equal to the distance to the k-th nearest vector belonging to distortion d_m. A quick multimodal estimate of $p(x_i|d_m)$ can also be formed by modeling the density as a Gaussian mixture. Typically, (1) is used during feature evaluation and selection, while the Gaussian mixture is used for classifier design.

The probability of distortion d_m is given by the Bayes relationship

$$P(d_m|x_i) = \frac{p(x_i|d_m) \cdot P(d_m)}{\sum_j p(x_i|d_j) \cdot P(d_j)} \tag{2}$$

where $P(d_m)$ is the prior probability of the m-th distortion.

Opinion Score Probability

An estimate of the opinion score probability function, $P(\omega_q|x_i)$, can now be obtained. This is the probability of opinion score ω_q, where the classes range from q=1 (unacceptable) to q=5 (excellent). This function is interpreted as the predicted frequency of listener panel scores corresponding to test speech, x_i. The relationship is given by

$$P(\omega_q|x_i) = \sum_m P(d_m|x_i) \cdot P(\omega_q|x_i,d_m) \tag{3}$$

where $P(\omega_q|x_i,d_m)$ is the probability that opinion score ω_q is chosen given distortion d_m and parameter vector x_i. This function is approximated by the listener-panel relative frequencies for distortion d_m, given by $\hat{P}(\omega_q|X,d_m)$.

Classification and Mean Opinion Score Prediction

Having estimated class probability (3), we can now obtain a minimum probability-of-error classification of voice quality. This is given by the ω_q that gives the largest value of $P(\omega_q|x_i)$. It represents the quality level most likely to be selected by a listener panel member. In a similar fashion, (2) can be used to choose the most likely distortion.

The minimum mean-squared error prediction of Mean Opinion Score is found as:

$$MOS_i = \sum_{q=1}^{5} q \cdot P(\omega_q|x_i) \tag{4}$$

$$MOS = \left(\sum_{i=1}^{N} MOS_i \right) / N \tag{5}$$

where N is the number of parameter vectors used in the assessment.

Expert System

An expert system is being developed to handle impairments that are difficult to deal with using standard objective techniques. Examples include infrequent pops and clicks, delay and echo, time warping, and effects of TASI (time assignment speech interpolation) circuits. Other factors affecting voice quality are application dependent and may not be measurable from the speech. These include the user's nationality, hearing impairments, and expectations about grade of service. Rules and facts about human perception are being identified to specifically deal with these issues. The resultant knowledge base will embody information from a wide variety of studies dealing with the effects of such factors on voice quality. The expert system will use this knowledge base, along with the SPR assessment of each segment group, to create a final, overall quality classification.

4. Example Results

Figs. 2 through 5 demonstrate example results representing the major elements of the system. Fig. 2 shows results of applying the bottom-up evaluation procedure to identify an effective parameter set. Mean-squared error of predicted MOS is plotted against the number of iterations. Each iteration either adds or removes a parameter from the current parameter set in order to minimize error. For example, in the first iteration, the parameter LPC-04 is added and in the fifth iteration, parameter AUTOCR05 is removed. The algorithm terminates on the seventh iteration when it can find no way to further reduce the mean-squared error.

Fig. 3 shows decision boundaries resulting from training the Bayes classifier. The speech parameter set consists of LPC-01 (horizontal axis) and LPC-05 (vertical axis). Cluster analysis results are indicated with unit standard deviation ellipses to represent cluster locations. These are used to form a Gaussian mixture estimate of the probability density for each impairment. Three types of training data are used: speech plus 0 dBRNC* ("A" ellipses), 25 dBRNC ("B" ellipses), and 45 dBRNC ("C" ellipses) added noise. The most likely opinion score was derived using (2) and (3) and is depicted on the figure by different cross-hatching. Note that "A" ellipses (no added noise) are mostly located in regions of excellent (class 5) or good (class 4) quality. Similarly, "B" (25 dBRNC added noise) and "C" (45 dBRNC added noise) ellipses are located in regions of lower quality. As Fig. 3 shows, (3) the decision boundaries are also extrapolated into areas containing no training data.

* dBRNC refers to decibels above reference noise, C-message weighted.

Equations (1) through (5) are based on the assumption that parameter measurements are statistically stationary. Unfortunately, normal speech is only locally stationary, and this reduces system performance. The effect of nonstationarity is lessened by segmenting the speech prior to training. Each segment type is composed of statistically similar frames of speech. These are chosen using cluster analysis techniques. Fig. 4 shows an example of segmentation into five types, where five was chosen arbitrarily. Vertical lines relate the speech signal, on top, to the corresponding segment types, below. The EPR system is applied separately to each segment type, yielding multiple assessments that must be combined into a single quality prediction. This can be done using regression or expert system techniques. As expected, preliminary results indicate that segmentation improves assessment accuracy.

Fig. 5 shows the system's assessment of speech plus added noise. For this example, only four impairments were used to train the system. The predicted opinion score histogram is shown on top. A histogram of the listener panel opinion scores immediately follows. Also shown are predicted and actual MOS values, most likely opinion score, and distortion probabilities for the impairments used to train the classifier.

5. Conclusions

This paper has described a new technique for processing objective parameters to obtain voice quality assessment. The method combines statistical pattern recognition techniques with a knowledge-based expert system. The SPR module uses optimally selected voice parameters to form a purely statistical assessment of voice quality. Output includes a classification of the most likely opinion score, a prediction of mean opinion score, and the predicted opinion score frequencies. An expert system is being developed to combine these results with additional knowledge bases to account for factors such as delay, which are not accounted for by the SPR system.

References

[1] B.J. McDermott, C. Scagliola, and D. Goodman, "Perceptual and objective evaluation of speech processed by adaptive differential PCM," Bell Syst. Tech. J., vol. 57, no. 5, pp. 1597-1618, May-June 1978.

[2] P. Mermelstein, "Evaluation of a segmental SNR measure as an indicator of the quality of ADPCM coded speech," J. Acoust. Soc. Am., vol. 66, no. 6, pp. 1664-1667, Dec. 1979.

[3] N. Kitawaki, H. Nagabuchi, and K. Itoh, "Objective quality evaluation for low-bit-rate speech coding systems," IEEE J. on Sel. Areas in Communications, vol. 6, no. 2, pp. 242-248, Feb. 1988.

[4] E.A. Quincy, "PROLOG-based expert pattern recognition system shell for technology independent, user-oriented, classification of voice transmission quality," Proceedings IEEE-ICC 87, Vol. 2, pp. 1164-1171, June 1987.

[5] J. Kittler, "Feature selection and extraction," Handbook of Pattern Recognition and Image Processing, T. Y. Young and K. S. Fu, ed., Academic Press, Inc., Chapter 3, pp. 59-83, 1986.

[6] D.O. Loftsgaarden and C. P. Quesenberry, "A non-parametric estimate of a multivariate density function," Annals of Mathematical Statistics, vol. 36, pp. 1049-1051, June 1965.

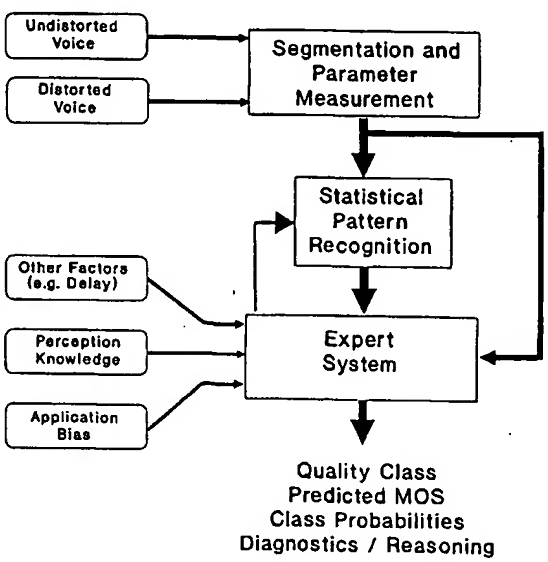

Fig. 1. System Overview.

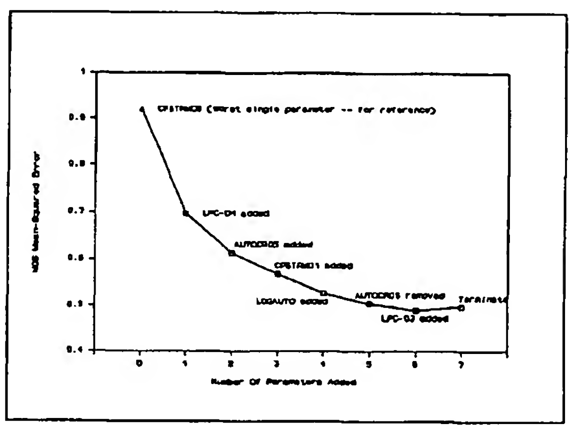

Fig. 2. MOS prediction error for parameter sets selected during a single bottom-up evaluation.

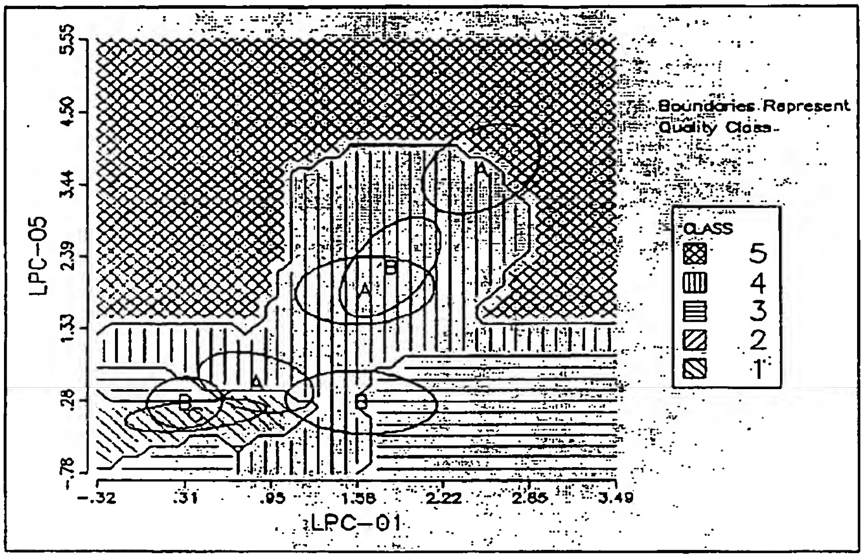

Fig. 3. Decision regions for most likely opinion score. Ellipses represent approximate training data locations for 0 dBRNC ("A"), 25 dBRNC ("B"), and 45 dBRNC ("C") added noise.

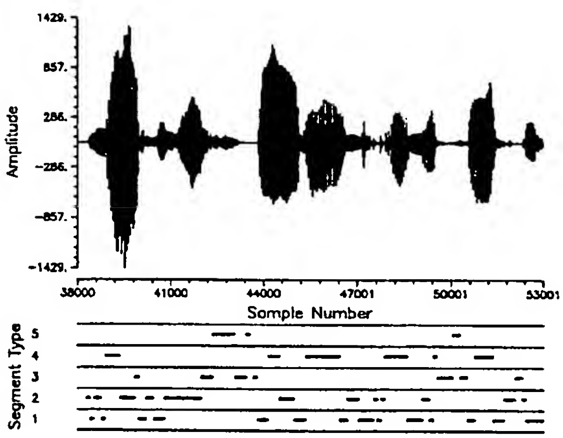

Fig. 4. Example of speech signal (above) and corresponding segment types (below).

OPINION SCORE FREQUENCY: PREDICTED

1 (Unaccept.) % 19.8
2 (Poor) % 31.1
3 (Fair) % 27.1
4 (Good) % 15.1
5 (Excellent) % 6.8

OPINION SCORE FREQUENCY: LISTENER PANEL

1 (Unaccept.) % 9.1
2 (Poor) % 47.7
3 (Fair) % 34.1
4 (Good) % 9.1
5 (Excellent) % 0.0

Predicted:	MOS: 2.6	Class:	2
Listener Panel:	MOS: 2.4	Class:	2

Distortion Probabilities:

SORCM2	0.10
NS25M2	0.21
NS35M2	0.35
NS45M2	0.34

Fig. 5. Example system output showing predicted and listener panel quality assessments: opinion score frequency, MOS, most likely opinion score (class), and distortion probabilities for four training impairments.